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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,982	12/13/2004	Eduardo Trifoni	267.184	1934

22852 7590 03/27/2008
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EXAMINER	
WANG, EUGENIA	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
03/27/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/517,982	TRIFONI ET AL.	
	Examiner	Art Unit	
	EUGENIA WANG	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20, 22, 24, and 27* is/are rejected.

7)☒ Claim(s) *6,8,12,21,23,25 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received February 19, 2008:

a. Claims 1-27 are pending.

b. Priority still has not been perfected.

c. The objections to the drawings have been withdrawn in light of the amendment.

d. The objections to the Specification have been withdrawn in light of the amendment.

e. The claim objections (except for the one with respect to claims 8 and 8) have been withdrawn in light of the amendment.

f. The 112 rejection has been withdrawn in light of the amendment.

g. The rejections with respect to US 2002/0142201 (Nelson et al.), US 2003/00039875 (Horiguchi et al.), and US 5998054 (Jones et al.) have been maintained, with any changes made in light of the amendment. Thus, the action is final.

Claim Objections

2. Claims 6 and 8 are objected to because of the following informalities: Claim 6 recites the typographical error “clam 5” in line 2, where it should read ‘claim 5’. Since claim 8 is dependent on claim 6, it is objected to for the same reason. Appropriate correction is required.

3. Claim 12 objected to because of the following informalities: reading “wherein a side channel ... fluidly connect” (line 4). Since channel is singular, it is submitted that the word ‘connects’ should be used for grammatical correctness. Appropriate correction is required.

Response to Arguments

4. Applicant's arguments filed February 19, 2008 have been fully considered but they are not persuasive.

Applicant submits that the error has been corrected.

Examiner respectfully disagrees. Claim 6 reads that it is dependent on "clam 5."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3, 5-12, 14-20, 22, 24, and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by US 2002/0142201 (Nelson).

As to claim 1, Nelson teaches a membrane electrochemical generator with a multiplicity of cells (fuel cell stack [10]), where gaseous reactants are fed into a fuel cell stack (para 0026, lines 1-7; fig. 1). Each fuel cell has an anode with a corresponding

anode side (anodic chamber) and a cathode with a corresponding cathode side (cathodic chamber), wherein a proton exchange membrane is placed in between (para 0005; para 0031; fig. 1). Additionally, fig. 1 depicts one fuel cell [12] (reactive cell) that is broken out. In that fuel cell, the anode cooler plate [16] and cathode cooler plate [20] serves as the conductive bipolar plates. (The cooler plates are inherently conductive through the MEA portion [18], as is required for fuel cell function within a stack and thus would serve as a conductive reticulated element.) Furthermore, it cooler plate shows a multiplicity of fluid injection calibrated holes (water inlet ports [58a-d]) for water to be injected in some sort of manner (and thus imparting some sort of calibrated flow) (fig. 3).

It is noted that although the injection of flow of cooling fluid does not flow into the reaction cell, this is intended use for an apparatus claim, wherein the apparatus of Nelson et al. is the same as that of the instant application.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

<u>Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function</u>. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" <u>if the prior art apparatus teaches all the structural limitations of the claim</u>. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

As applied to the apparatus claims.

(*For an alternate interpretation see the 103 rejection.)

As to claim 3, Nelson shows that the fluid injection calibrated holes [58a-d] are mutually aligned to cathode intake (feed) opening [24] and anode intake (feed) opening [30] as well as coolant intake (feed) opening [34], wherein coolant opening [34] can interpreted to be a side opening in a perimetrical portion of cathode cooler plate [20] or anode cooler plate [16] (figs. 3 and 4).

As to claim 5, Nelson's fuel cell stack has bipolar plate interposed between a pair of sealing gaskets, as demonstrated by coolant seal gasket [42] (anodic sealing gasket) and membrane gasket [44] (cathodic sealing gasket) (fig. 1). (Note: The membrane gasket [44] of fuel cell [12] and the coolant seal gasket [42] of fuel cell [14] (adjacent cells [12] and [14]) would surround the combined cathode cooler plate [20] of fuel cell [12].) The gaskets [42] and [44] form a hollow center portion, wherein the reticulated cooler plate sits (either cathode cooler plate [20] or anode cooler plate [16]). Using

gasket [42] and comparing it to that of reticulated anode cooler plate [16] of fuel cell [12] as a visual example, it is seen that the feed openings of the reactants [30, 24, 26, 32], the coolant side openings [34, 36], and the distribution channels that are fluidly connected to the feed openings [38] (fig. 1).

As to claims 6 and 7, Nelson teaches that cathode reactant surface [27] has a gasket group [76] that receives the membrane gasket [44] (para 0042). Therefore groove [76] is indicative of how gasket [44] fits onto the plate. As seen in fig. 4, there is a fluid collection channel (water channel [72]) connected to side opening [34] interposed between cathode and anode opening [24, 30] and the cathode channels [28a-d]. As water channel [72] delivers water from water intake [70] to the water inlet ports [58a-d], it collects cooling fluid (fig. 4; para 0041) (as applied to claims 6 and 7). Furthermore, it can be noted that the fluid connection channel [72] is connected to the distribution channels [28a-d], as it is placed next to the area where the distribution channels are (fig. 4) (as applied to claim 7).

As to claim 8, Nelson teaches that channel [72] is superposed on the fluid injection calibrated holes [58a-d] (compare to membrane gasket [44]) (figs. 1 and 4). There is some sort of correspondence of this to the distribution channels of the other sealing gasket, barring a specified correspondence (compare the superimposition of membrane gasket [44] to coolant seal gasket [42]). (Note: Absent clear definition, the assembly of Nelson is considered to be filter-press, as a stack would be pressed together.)

As to claim 9, Nelson teaches a fuel cell stack, wherein every other cell can be defined as a “cooling cell.” Therefore, in fig. 1, fuel cell [12] can be defined as a reaction cell, fuel cell [14] can be defined as an additional cell, and fuel cell [15] can be defined as a reaction cell, etc. (although only 3 cells are shown in the stack, a typical stack includes many more) (para 0026). The cooling cell comprises a gasket [42, 44] (perimetrical portion having a central hollow portion). For example, taking the gasket groove [76] of fig. 4, it is indicated that there is an opening for the passage for the cooling fluid [34]. There is a fluid collection channel (groove corresponding to water channel [72]) connected to side opening [34] (fig. 4). Furthermore, that the gasket allows for feed openings for passage of gaseous reactants (cathode and anode inlet openings [24], [30]) and discharge openings for discharging reaction products and residual reactants (anode and cathode outlet openings [32], [26]) (fig. 4). (This is applying the features of exemplified fuel cell [12] to that of fuel cell [14].) The cooler plates are inherently conductive through the MEA portion [18], as is required for fuel cell function within a stack and thus would serve as a conductive reticulated element in the central hollow portion (fig. 4).

As to claim 10, Nelson’s has fluid collection channel [72] placed between the feed openings [30, 4] and the central hollow portion (the part where the channels [28a-d] of the cooler plate [20] are).

As to claim 11, Nelson teaches the fluid collection channel (portion of gasket represented by the groove portion corresponding to channel [72]) is superposed on the fluid injection calibrated holes [58a-d] of the bipolar plate (cathode cooler plate [20]) (fig.

4). (Note: Absent clear definition, the assembly of Nelson is considered to be filter-press, as a stack would be pressed together.)

As to claim 12, Nelson's gasket portion with the hollow center is fluidly connected with a side opening (coolant inlet [34]) via a side channel (water collection portion [72]) via the channels of the coolant plate [20].

As to claim 14, Nelson teaches a bipolar plate (as exemplified by cathode cooler plate [20]) with a multiplicity of first calibrated holes for the passage of reactants [68a-68d] and a multiplicity of second calibrated holes for the discharge of optional residual reactants [70a-d]. It can be shown that the fluid injection calibrated holes [58a-d] are placed in correspondence to that of the first calibrated holes [68a-d].

As to claim 15, Nelson's invention has first calibrated holes [68a-d] mutually aligned and placed in some sort of correspondence to feed openings [24, 30] of the bipolar plate (cathode cooler plate [20]) (fig. 4). Accordingly, second calibrated holes [70a-d] are placed in some correspondence to discharge openings [26, 32], which are placed on a perimetrical portion of conductive plate [20] (fig. 4). (Note: In another interpretation, the bipolar plate can comprise of the combination of the cathode cooler plate [20] and anode cooler plate [16], which is not shown. However it is mentioned that it is the mirror image to that of the cathode plate (para 0043).)

As to claim 16, Nelson's stack has a sealing gasket (membrane gasket [44]) that is seen to cover only one face of the bipolar plate (cathode cooler plate [20]), wherein the gasket [44] has a central hollow portion for conductive reticulated element (portion [28]).

As to claim 17, using a broad interpretation, Nelson's teaching can be applied. Either gasket [42, 44] of the cooler plates in every other cell can be considered to be a cooling cell (with the intermediate cells being the reaction cells). For example purposes, membrane gasket [44] is focused on. Using this interpretation, since membrane gasket [44] is a "cooling cell" as the fuel cell it belongs to is not interpreted to be a reaction cell. However, the cells on either side of it are interpreted to be "reaction cells." Using fig. 1, the cell to the right of fuel cell [12] (not shown) is a reaction cell, as is fuel cell [14]. Fuel cell [12] is not interpreted to be a reaction cell, however membrane gasket [44] is considered to be a cooling cell sandwiched between two reaction cells. The frame of the gasket is the rigid perimetric portion (as it has some degree of rigidity, especially when compressed within fuel cell stack), with a hollow center (fig. 1). (For a better view of the shape of the gasket, please refer to fig. 4, item [76]. Item [76] is a groove for the gasket, and so the gasket's shape is as shown.) As seen in fig. 4, the gasket area separates the gaseous reactants (fuel inlet [30], fuel outlet [32], oxidant inlet [24] and oxidant outlet [26]) from the central portion (portion defined by the channels [28]). Additionally, the hollow center has an area for the electrically conductive central portion of the cathode cooler plate, in which it is placed on. (Recall, the channels of the in the central portion of the cooler plates are inherently electrically conductive, as is necessary for the function of the fuel cell stack.)

As to claim 18, Nelson's gasket (as embodied by the shape of the gasket groove [76] for clarity's sake) has reactant feed openings [30, 24], reactant discharge openings [26, 32], as well as side openings for the passage of cooling fluid [34, 36].

As to claim 19, Nelson et al.'s additional cell is a gasket, and so each face is covered by a gasket that defines a rigid perimetrical portion (as the claim does not preclude the gasket and the additional cell being one in the same). The sections that separate the reactant inlets [30, 24] can be considered a zone for collecting the reactants, wherein the zones are connected to the respective feed openings through a feed channel (as reactant is introduced) in correspondence to the inlets, as some reactant would gather in the areas around the inlets, but blocked off by the seal area. Likewise, the sections that separate the reactant outlets [26, 32] can be considered a collection zone placed in correspondence to the outlets (and thus discharge/outlet channels), as some discharge would gather in the areas around the outlets, but blocked off by the seal area. Note, it can be interpreted that there is a channel that connects the collection zone to the outlet, with the channel being the height of the gasket itself.

As to claim 20, Nelson's gasket [44] is the additional cell. And the portions of seal portions around the reaction inlets/outlets [30/24, 26/32] serve to hinder the leakage of reactant and reactant products from entering the central hollow portion, and thus hinders the passage of gaseous reactants and reaction products within the cell.

As to claim 22, Nelson teaches that fluid injection calibrated holes [58a-d] are placed between first calibrated holes [68a-d] (fig. 4). The gasket (defined by gasket groove [76] in fig. 4) defines a fluid collection channel, wherein some portion is below the feed openings [30, 24]. The channel is defined by the height of the height of the gasket.

As to claim 24, it can be seen that the fluid collection channel (created by the gasket, its represented structure filling that of gasket groove [76]) is superposed to the calibrated holes [58a-d].

As to claim 27, Nelson teaches that the coolant is a mixture of gas and liquid water (abs).

6. Claims 1, 2, 4 and 27 rejected under 35 U.S.C. 102(b) as being anticipated by US 5998054 (Jones et al.).

As to claim 1, Jones et al. teaches an electrochemical generator (fuel cell assembly [100]), wherein the working section [114] made up of many layers [118] that form fluid manifolds for supplying fluids to and removing fluids from the working section, where each layer forms a working cell (the exemplified multiplicity of cells provided being 108) (col. 4, lines 65-67; col. 5, lines 1-10; fig. 1). It is noted that fuel cell is a PEM-type fuel cell with a cathode (cathodic chamber) and an anode (anodic chamber) around a PEM (membrane) (col. 5, lines 10-20). (The cells must react with the reactants in order to provide the function of a fuel cell.)The cells have a fluid flow plate [120] (electrically conductive reticulated metal) made of conductive material, such as graphite and can be a **bipolar**, monopolar, anode cooler, or cathode cooler plate (col. 5, lines 32-40; fig. 2). Furthermore, liquid water is metered into each fluid flowplate inlet [126] through injection ports [131] (col. 6, lines 28-37; fig. 3). As liquid water is injected, it is considered that it is a cooling fluid that is injected inside the reaction cells [118]. (It is said that the injection ports [131] can be made circular with a diameter of 0.005 to

0.010 inches, thus imparting some calibration to the holes and some calibration to the flow with respect to the hole size.)

As to claim 2, Jones et al.'s invention would inherently have some degree of evaporation, as the liquid water (cooling liquid) is injected and provides humidification and thermal management as it passes through the cell. (The reason for inherency is that the fuel cell runs at a certain temperature and thus by passing liquid water through it, some of it would evaporate to some degree, thus absorbing heat and removing heat generated in the reaction of the electrochemical generator.)

As to claim 4, Jones et al. teaches that the diameter of the injection ports [131] is circular with a diameter of 0.005 to 0.010 in., depending on such factors as desired water injection rates (col. 5, lines 64-66). Using the conversion that 1 in. = 25.4 mm, the range 0.005 to 0.010 in. is equivalent 0.127 mm to 0.254. Therefore for the range of 0.200 mm to 0.254 mm that Jones et al. teaches is anticipatory of the range claimed by the instant application.

As to claim 27, Jones et al. teaches that liquid water is injected into ports 131 (col. 6, lines 28-38), and thus it can be considered a cooling fluid.

7. Claims 1, 2, 9, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by US 2003/0039875 (Horiguchi et al.).

As to claim 1, Horiguchi et al. teach a membrane electrochemical cell with reaction cells, as indicated by fig. 6 with fuel cell stack [1] indicating a multiplicity of cells. In a close-up view, it is seen that unit cells [10A] are split by a bipolar plate (current collectors [14, 15]), which are made out of conductive metal (fig. 5; para 0067).

Furthermore one portion of the bipolar plate (current collector [14]) has a multiplicity of calibrated holes (through-holes [143]), which imparts some sort of calibrated flow for a cooling fluid (water in cooling space [S2] through the holes [143] to air space [S1]). It is noted that Horiguchi et al.'s reaction cell has an anodic chamber ([S3] side of the cell) and a cathodic chamber ([S1] side of cell). (Although one unit cell is not shown to have both in fig. 5, the representative view shows the structure of an anode [13] side and a cathode [12] side of each unit cell, and so each cell would have an anodic chamber and cathodic chamber.) Furthermore, current collectors [14, 15] made of conductive metal and provide reactant to the anode and cathode and are thus reticulated.

As to claim 2, Horiguchi et al. teach that water cools and then is evaporated, and the water vapor is absorbed into the air pass side [S1], thus humidifying and hydrating (para 0026-0027). The evaporation also inherently removes heat from the reaction. The basis for inherency is that since it takes heat to evaporate cooling material, the heat (which is generated by the electrochemical reaction) is thus absorbed and removed from electrochemical generator.

As to claim 9, Horiguchi et al. teaches additional cells, wherein every other cell in a fuel cell stack can be defined as a cooling cell, thus each cooling cell would be in between two reaction cells. It can be taken that the frame members [16, 17] are the perimetric portions with a central hollow portion (windows [164, 174]). It is noted that the electrically conductive reticulated element (the channels of the current collectors [14, 15]) reside in the hollow portion (fig. 3). It is also noted that since frames [16, 17] are provided for the current collector, they allow for reactants to pass (for example in fig.

3, oblong passages [144, 153] in collectors [14] and [15] are the inlet and outlet passages for hydrogen, wherein the oblong passages [144, 153] correspond to holes [165, 173] in the frame [16, 17]). Furthermore, passages [173] of the frame [17] in fig. 7 exemplify air passages [173] (with inlet being on one side and the outlet being on the other side). It is noted that both the coolant (water) and air are flowed through the air passes [173], so air passes [173] also serve as the “side openings” as claimed by the instant application (fig. 7; para 0021).

As to claim 13, Horiguchi et al. teaches that water runs through cooling space [S2], and as can bee seen in fig. 5, some water is transferred through the through-holes [143], as the water traverses the area. Therefore, there is a portion of water that traverses the whole plate before entering the fluid injection holes [143] of its adjacent reaction cell (see fig. 16, for how the air traverses through the plate and through holes before exiting).

Response to Arguments

8. Applicant's arguments filed February 19, 2008 have been fully considered but they are not persuasive.

With respect to Nelson, Applicant argues that since the amended claim amendment states that the water flows from the cooling cells into the reaction cells (wherein Nelson‘s cell has the opposite action), Nelson no longer applies.

Examiner respectfully disagrees. As set forth in the 102 rejection under Nelson, it is taken such claim language is intended use and is functional, and thus does not have weight on the apparatus. Therefore, it is submitted that the apparatus of Nelson is

still the same as that claimed by the instant application. Please see the rejection of claim 1 for the Office's policy on "functional" language and "intended use" for apparatus cases. It is noted herein that an alternate rejection wherein the intended use is taken into consideration is also given in the 103 section. Therefore, it is set forth that such actions in newly amended claim 1 would have still been obvious to one of ordinary skill in the art.

With respect to Jones et al., Applicant argues that the bipolar plate is not a conductive reticulated element, wherein the reticulated element is a network of veins or wires that delivers gaseous reactants while electrically connecting the bipolar plates.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the specific definition of reticulated element, as defined in the specification and examples provided in the specification) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claim language is broader than what the Specification teaches, and thus the interpretation of the prior art would still read on the claimed invention.

With respect to Horiguchi et al., Applicant argues that the current collector is not a conductive reticulated element, wherein the reticulated element is a network of veins or wires that delivers gaseous reactants while electrically connecting the bipolar plates.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the specific definition of reticulated element, as defined in the specification and examples provided in the specification) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claim language is broader than what the Specification teaches, and thus the interpretation of the prior art would still read on the claimed invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Alternately, claims 1, 3, 5-12, 14-20, 22, 24, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson in view of Jones et al.

As to claim 1, Nelson teaches a membrane electrochemical generator with a multiplicity of cells (fuel cell stack [10]), where gaseous reactants are fed into a fuel cell stack (para 0026, lines 1-7; fig. 1). Each fuel cell has an anode with a corresponding anode side (anodic chamber) and a cathode with a corresponding cathode side (cathodic chamber), wherein a proton exchange membrane is placed in between (para 0005; para 0031; fig. 1). Additionally, fig. 1 depicts one fuel cell [12] (reactive cell) that is broken out. In that fuel cell, the anode cooler plate [16] and cathode cooler plate [20] serves as the conductive bipolar plates. (The cooler plates are inherently conductive through the MEA portion [18], as is required for fuel cell function within a stack and thus would serve as a conductive reticulated element.) Furthermore, it cooler plate shows a multiplicity of fluid injection calibrated holes (water inlet ports [58a-d]) for water to be injected in some sort of manner (and thus imparting some sort of calibrated flow) (fig. 3).

In this alternate interpretation, it can be said that Nelson does not teach specifically teach of injecting water (cooling fluid) into the reaction cells.

However, Jones et al. teach of metering water into the reactants (and thus the reaction cell) in order to advantageously and properly humidify the reactants. Therefore the motivation for operating the fuel cell of Nelson in the opposite manner as taught would be to make sure that the reactants are properly humidified. Therefore one of ordinary skill in the art at the time the invention was made would have found it obvious to use the structure of Nelson in such a way to promote proper humidification of the cell (i.e. inject cooling fluid (water) into the reaction cell).

As to claim 3, Nelson shows that the fluid injection calibrated holes [58a-d] are mutually aligned to cathode intake (feed) opening [24] and anode intake (feed) opening [30] as well as coolant intake (feed) opening [34], wherein coolant opening [34] can interpreted to be a side opening in a perimetrical portion of cathode cooler plate [20] or anode cooler plate [16] (figs. 3 and 4).

As to claim 5, Nelson's fuel cell stack has bipolar plate interposed between a pair of sealing gaskets, as demonstrated by coolant seal gasket [42] (anodic sealing gasket) and membrane gasket [44] (cathodic sealing gasket) (fig. 1). (Note: The membrane gasket [44] of fuel cell [12] and the coolant seal gasket [42] of fuel cell [14] (adjacent cells [12] and [14]) would surround the combined cathode cooler plate [20] of fuel cell [12].) The gaskets [42] and [44] form a hollow center portion, wherein the reticulated cooler plate sits (either cathode cooler plate [20] or anode cooler plate [16]). Using gasket [42] and comparing it to that of reticulated anode cooler plate [16] of fuel cell [12] as a visual example, it is seen that the feed openings of the reactants [30, 24, 26, 32],

the coolant side openings [34, 36], and the distribution channels that are fluidly connected to the feed openings [38] (fig. 1).

As to claims 6 and 7, Nelson teaches that cathode reactant surface [27] has a gasket group [76] that receives the membrane gasket [44] (para 0042). Therefore groove [76] is indicative of how gasket [44] fits onto the plate. As seen in fig. 4, there is a fluid collection channel (water channel [72]) connected to side opening [34] interposed between cathode and anode opening [24, 30] and the cathode channels [28a-d]. As water channel [72] delivers water from water intake [70] to the water inlet ports [58a-d], it collects cooling fluid (fig. 4; para 0041) (as applied to claims 6 and 7). Furthermore, it can be noted that the fluid connection channel [72] is connected to the distribution channels [28a-d], as it is placed next to the area where the distribution channels are (fig. 4) (as applied to claim 7).

As to claim 8, Nelson teaches that channel [72] is superposed on the fluid injection calibrated holes [58a-d] (compare to membrane gasket [44]) (figs. 1 and 4). There is some sort of correspondence of this to the distribution channels of the other sealing gasket, barring a specified correspondence (compare the superimposition of membrane gasket [44] to coolant seal gasket [42]). (Note: Absent clear definition, the assembly of Nelson is considered to be filter-press, as a stack would be pressed together.)

As to claim 9, Nelson teaches a fuel cell stack, wherein every other cell can be defined as a "cooling cell." Therefore, in fig. 1, fuel cell [12] can be defined as a reaction cell, fuel cell [14] can be defined as an additional cell, and fuel cell [15] can be defined

as a reaction cell, etc. (although only 3 cells are shown in the stack, a typical stack includes many more) (para 0026). The cooling cell comprises a gasket [42, 44] (perimetrical portion having a central hollow portion). For example, taking the gasket groove [76] of fig. 4, it is indicated that there is an opening for the passage for the cooling fluid [34]. There is a fluid collection channel (groove corresponding to water channel [72]) connected to side opening [34] (fig. 4). Furthermore, that the gasket allows for feed openings for passage of gaseous reactants (cathode and anode inlet openings [24], [30]) and discharge openings for discharging reaction products and residual reactants (anode and cathode outlet openings [32], [26]) (fig. 4). (This is applying the features of exemplified fuel cell [12] to that of fuel cell [14].) The cooler plates are inherently conductive through the MEA portion [18], as is required for fuel cell function within a stack and thus would serve as a conductive reticulated element in the central hollow portion (fig. 4).

As to claim 10, Nelson's has fluid collection channel [72] placed between the feed openings [30, 4] and the central hollow portion (the part where the channels [28a-d] of the cooler plate [20] are).

As to claim 11, Nelson teaches the fluid collection channel (portion of gasket represented by the groove portion corresponding to channel [72]) is superposed on the fluid injection calibrated holes [58a-d] of the bipolar plate (cathode cooler plate [20]) (fig. 4). (Note: Absent clear definition, the assembly of Nelson is considered to be filter-press, as a stack would be pressed together.)

As to claim 12, Nelson's gasket portion with the hollow center is fluidly connected with a side opening (coolant inlet [34]) via a side channel (water collection portion [72]) via the channels of the coolant plate [20].

As to claim 14, Nelson teaches a bipolar plate (as exemplified by cathode cooler plate [20]) with a multiplicity of first calibrated holes for the passage of reactants [68a-68d] and a multiplicity of second calibrated holes for the discharge of optional residual reactants [70a-d]. It can be shown that the fluid injection calibrated holes [58a-d] are placed in correspondence to that of the first calibrated holes [68a-d].

As to claim 15, Nelson's invention has first calibrated holes [68a-d] mutually aligned and placed in some sort of correspondence to feed openings [24, 30] of the bipolar plate (cathode cooler plate [20]) (fig. 4). Accordingly, second calibrated holes [70a-d] are placed in some correspondence to discharge openings [26, 32], which are placed on a perimetrical portion of conductive plate [20] (fig. 4). (Note: In another interpretation, the bipolar plate can comprise of the combination of the cathode cooler plate [20] and anode cooler plate [16], which is not shown. However it is mentioned that it is the mirror image to that of the cathode plate (para 0043).)

As to claim 16, Nelson's stack has a sealing gasket (membrane gasket [44]) that is seen to cover only one face of the bipolar plate (cathode cooler plate [20]), wherein the gasket [44] has a central hollow portion for conductive reticulated element (portion [28]).

As to claim 17, using a broad interpretation, Nelson's teaching can be applied. Either gasket [42, 44] of the cooler plates in every other cell can be considered to be a

cooling cell (with the intermediate cells being the reaction cells). For example purposes, membrane gasket [44] is focused on. Using this interpretation, since membrane gasket [44] is a “cooling cell” as the fuel cell it belongs to is not interpreted to be a reaction cell. However, the cells on either side of it are interpreted to be “reaction cells.” Using fig. 1, the cell to the right of fuel cell [12] (not shown) is a reaction cell, as is fuel cell [14]. Fuel cell [12] is not interpreted to be a reaction cell, however membrane gasket [44] is considered to be a cooling cell sandwiched between two reaction cells. The frame of the gasket is the rigid perimetric portion (as it has some degree of rigidity, especially when compressed within fuel cell stack), with a hollow center (fig. 1). (For a better view of the shape of the gasket, please refer to fig. 4, item [76]. Item [76] is a groove for the gasket, and so the gasket’s shape is as shown.) As seen in fig. 4, the gasket area separates the gaseous reactants (fuel inlet [30], fuel outlet [32], oxidant inlet [24] and oxidant outlet [26]) from the central portion (portion defined by the channels [28]). Additionally, the hollow center has an area for the electrically conductive central portion of the cathode cooler plate, in which it is placed on. (Recall, the channels of the in the central portion of the cooler plates are inherently electrically conductive, as is necessary for the function of the fuel cell stack.)

As to claim 18, Nelson’s gasket (as embodied by the shape of the gasket groove [76] for clarity’s sake) has reactant feed openings [30, 24], reactant discharge openings [26, 32], as well as side openings for the passage of cooling fluid [34, 36].

As to claim 19, Nelson et al.’s additional cell is a gasket, and so each face is covered by a gasket that defines a rigid perimetrical portion (as the claim does not

preclude the gasket and the additional cell being one in the same). The sections that separate the reactant inlets [30, 24] can be considered a zone for collecting the reactants, wherein the zones are connected to the respective feed openings through a feed channel (as reactant is introduced) in correspondence to the inlets, as some reactant would gather in the areas around the inlets, but blocked off by the seal area. Likewise, the sections that separate the reactant outlets [26, 32] can be considered a collection zone placed in correspondence to the outlets (and thus discharge/outlet channels), as some discharge would gather in the areas around the outlets, but blocked off by the seal area. Note, it can be interpreted that there is a channel that connects the collection zone to the outlet, with the channel being the height of the gasket itself.

As to claim 20, Nelson's gasket [44] is the additional cell. And the portions of seal portions around the reaction inlets/outlets [30/24, 26/32] serve to hinder the leakage of reactant and reactant products from entering the central hollow portion, and thus hinders the passage of gaseous reactants and reaction products within the cell.

As to claim 22, Nelson teaches that fluid injection calibrated holes [58a-d] are placed between first calibrated holes [68a-d] (fig. 4). The gasket (defined by gasket groove [76] in fig. 4) defines a fluid collection channel, wherein some portion is below the feed openings [30, 24]. The channel is defined by the height of the height of the gasket.

As to claim 24, it can be seen that the fluid collection channel (created by the gasket, its represented structure filling that of gasket groove [76]) is superposed to the calibrated holes [58a-d].

As to claim 27, Nelson teaches that the coolant is a mixture of gas and liquid water (abs).

Allowable Subject Matter

10. Claims 21, 23, 25, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an Examiner's statement of reasons for allowance: None of the prior art of record, alone or in combination appear to teach, suggest, or render obvious the invention of at least claims 21, 23, 25, and 26.

Claim 21 teaches a generator comprising the elements therein. Notably, it teaches that the zone for collecting the gaseous reactants is superposed to said first calibrated holes and said zone of collection of the reaction products and of the residual reactants is superposed to said second calibrated holes.

Nelson's teaching can be seen in fig. 4. It is clear that the zone for collecting both the reactants and the products (the areas around inlets and outlets [30, 24, 26, 32]) are not superposed on the first and second calibrated holes, [68a-d] and [70a-d], respectively.

Claim 23 teaches a generator comprising the elements therein. Notably, it teaches that there is a fluid collection channel located between said feed openings of said additional cell and said zone of collection of the gaseous reactants.

Nelson's teaching can be seen in fig. 4. It is clear that there is no fluid collection channel located between the gasket (shown by portion [76]), which is interpreted as the

cooling cell, between the inlet openings [30, 24] and the zone for collecting (interpreted as the gasketed portion below the inlet openings).

Claim 25 teaches a generator comprising the elements therein. Notably, it teaches that there is a first and a second fluid collection lateral channel connected to the side openings of the cooling cells and placed above said discharge openings of said cooling cells and that said cooling fluid, prior to reaching said fluid injection holes passes through the first and second fluid collection lateral channels to cross subsequently the whole surface of said respective electrically conductive reticulated element pre-heating counter-currently or concurrently with respect to at least one gaseous flow entering said reaction cells..

Nelson's teaching can be seen in fig. 4. It is clear that no lateral channels exist. Even if they did, they would not impart the structure that allows cooling fluid to traverse the whole surface before reaching the fluid injection holes.

Claim 26 teaches a generator comprising the elements therein. Notably, it teaches a first and second fluid collection lateral channel connected said side openings of said of said cooling cells and placed above said discharge openings, a third and a fourth fluid collection lateral channel connected to said side openings of said cooling cells and placed below said feed openings of said cooling cells, a fluid collection channel located between said feed openings of said cooling cells and said zone of collection of the gaseous reactants and connected to said side openings of said cooling cells, that said cooling fluid, prior to reaching said fluid injection holes enters through said first and second fluid collection lateral channel to subsequently cross the whole

surface of said respective electrically conductive reticulated element pre-heating counter-currently or concurrently with respect to at least one gaseous flow entering said reaction cells, said cooling fluid subsequently exiting from said third and fourth fluid collection lateral channel, and that in a filter-press configuration said fluid collection channel is superposed to said fluid injection calibrated holes.

Nelson's teaching can be seen in fig. 4. It is clear that no lateral channels exist. Even if they did, they would not impart the structure that allows cooling fluid to traverse the whole surface before reaching the fluid injection holes. Furthermore, no fluid collection channel is interposed within the gasket (shown by portion [76]), which is interpreted as the cooling cell, between the inlet openings [30, 24] and the zone for collecting (interpreted as the gasketed portion below the inlet openings).

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on 7 - 4:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1795

/Gregg Cantelmo/

for E. Wang, Examiner of Art Unit 1795